

The influence of uniform electrical field on the optical properties of size-quantized cylindrical semiconductor layer

V. A. Harutyunyan^{*}, H. Sh. Petrosyan

State Engineering University of Armenia, Gyumree Branch, Department of Physics, 2 M. Mkrtchyan St., Gyumree, 377503, Armenia.

Recently along with many low-dimensional semiconductors, different quasi-one-dimensional quantized structures have been investigated from the viewpoint of fundamental physics and from the interest for application to modern optical and electrical devices.

In this report the influence of homogeneous electrical field on single-electronical states and respectively on the optical properties of quantized cylindrical layer is considered. For device application these structures are interesting since they combine both the properties of quantized films, as well as of quantum wires.

For transversal quantized motion of charge carriers the energy spectrum and wave functions of single electronic states are obtained. In the second order of perturbation the explicit dependencies of Stark shift and of the electroabsorption coefficient on field intensity and geometrical sizes of system are revealed.

For the motion along the axis of symmetry the one-dimensional Wannier-Mott type excitons will exist in the layer. Respectively the influence of uniform field on the interband optical absorption far from the excitonic resonance is investigated. In quasi-classical approximation an expression is obtained for the *exciton factor* of absorption. The tunneling-ionization probability of one-dimensional exciton in the presence of electrical field is calculated.

^{*} Corresponding author. Tel. (+37441) 315-28. FAX (+37441) 315-28.
Email address: volhar@mail.ru (V. A. Harutyunyan).